WADER BREEDING SUCCESS IN THE 2012 ARCTIC SUMMER, BASED ON JUVENILE RATIOS OF BIRDS WHICH SPEND THE NON-BREEDING SEASON IN AUSTRALIA

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INTRODUCTION

Reproduction rate is one of the two key parameters controlling wader populations. Each year since 1999 (Minton et al. 2000) the results of percentage juvenile monitoring (a proxy for reproductive rate) in Australia by the Victorian Wader Study Group (VWSG) and the Australasian Wader Studies Group (AWSG) have been published in Arctic Birds and in Stilt (the AWSG Journal). The paper in Arctic Birds facilitates comparison between annual breeding success results obtained by this method with information generated from a variety of other sources/methods across the whole of the Arctic breeding areas, also published in Arctic Birds. The paper in Stilt informs Australian and other wader researchers in the East Asian/Australasian Flyway of the results of this key element of their fieldwork programmes. Another objective of the parallel publication of these results is to set the data on permanent record for use by those who are interested in analysing long term data sets for relationships and causes of variations in reproductive success of Arctic breeding birds worldwide.

The rationale behind using percentage juvenile data to assess breeding success, and caveats concerning the interpretation and use of such data, were fully covered in last year’s papers (Minton et al 2012.).

This paper presents the results of percentage juvenile sampling of waders in south-east Australia (SEA) and north-west Australia (NWA) during the November 2012 to March 2013 non-breeding season. This data provides estimates of wader breeding success for a range of species in the 2012 Northern Hemisphere summer.

METHODS

Information was again obtained from cannon-net catches of waders at high-tide roosts at a variety of locations throughout the non-breeding season (Minton et al. 2005). The usual sampling period was used in NWA (1 November to 21 March) and in SEA from mid-November. This year the sampling of Sanderling and Ruddy Turnstone in SEA was continued beyond the end of March because tide/logistical constraints forced key visits to the two main sampling areas to take place rather later than usual. However detailed recovery, flag-sighting and geolocator information obtained over recent years has shown that the sampling dates used this year were before any adult birds of either species were likely to have departed on northward migration.

The 2012 breeding success results are compared, as usual, in two different ways with the data generated over previous years (Minton et al. 2012). For the long data series now available in SEA (over 30 years in three species) the *median* percentage juvenile figure is quoted for comparison. In the shorter term data sets presented in Table 3 for SEA and in Table 4 for NWA the *mean* of the percentage juvenile figures for the previous 14 years (the limit of the NWA data set) are given. In general these two figures are similar but on some species there are differences, the reasons for which have not yet been investigated.

RESULTS

The figures for 2012/13 are given in Table 1 (SEA) and Table 2 (NWA). In the former all the usual species were sampled, except Red Knot. The population of this species has declined so much over the years that few catching opportunities are available. We have no good alternative information available to judge breeding success, although the visible presence of juveniles at some locations and numbers of overwintering birds in the 2013 austral winter suggests that Red Knot may have had at least some breeding success in 2012.

All the main species were sampled in NWA except for Sharp-tailed Sandpiper. Results are also given this year for Broad-billed Sandpiper.

Table 3 (SEA) and Table 4 (NWA) show that annual percentage juvenile results for each of the main species for each year since 1998/99, which is when annual sampling commenced in NWA. These tables facilitate comparisons between the two geographic regions of the non-breeding areas (3000km apart, one temperate and one tropical) and also in some cases facilitate comparisons between the same species in the two different areas.

DISCUSSION

The 2012 breeding season appears, unfortunately, to have been even poorer than the 2011 breeding season for most of the wader populations which visit SEA and NWA (Minton et al. 2012). This was especially so in NWA where in the Arctic-breeding species four out of seven were rated "very poor" and none achieved even average breeding success. In SEA Sanderling and Curlew Sandpiper also experienced a second successive very poor breeding outcome, but Red-necked Stint and Sharp-tailed Sandpiper were rated as being "good". This variation between species in some years has been noted previously, with Sharp-tailed Sandpiper particularly being a species which quite frequently differs in its breeding outcome from the majority of other species (Minton et al. 2005).

In contrast the NWA results show that species which breed less far north in Siberia (i.e. predominantly not in the Arctic) had a rather better breeding performance in 2012 than Arctic-breeding species. They also performed better than in 2011. Greater Sand Plover in particular showed a marked improvement (28.2% juveniles) after a couple of years with lower than average productivity.

The link between breeding success of waders and weather/predator conditions in their breeding areas continues to receive attention worldwide (Fraser et al. 2013, Nolet et al. 2013). Our own new analysis, mentioned in last year's paper and being carried out by Yaara Rotman/Marcel Klaassen of Deakin University, is still continuing. It does seem to confirm, as other researchers have also suggested, that the fairly rigorous lemming cycles present in the Arctic for several decades in the second half of the last century, have broken down in the last 20 or so years. With wader breeding success shown to be critically related to the lemming/predator numbers (Summers & Underhill 1987), it is not surprising therefore that the cycles of wader breeding success have also shown less regularity in the last two decades. One of the problems is that several critical factors vary independently – snow depth, date of snowmelt, June and July temperatures, late snowfalls during the hatching period and predator numbers. Sometimes variations in one factor will mask variations in another. Also it may be difficult to know about potentially devastating late snowfalls if these occur in only a limited area and for a short duration (i.e. without greatly affecting the monthly average temperature). The variable performance between species in a year may well relate to the chance mix of the critical factors which may occur in the main breeding location of a particular species.

CONCLUSION

Overall, 2012 was again a poor breeding season for most wader species which spend their non-breeding season in Australia. Given the pressures on many species of waders caused by loss of feeding habitat in key stopover locations in the Flyway it is desirable that they have the opportunity of offsetting survival losses due to this cause by having good breeding success when they are in the Arctic or elsewhere in Siberia. Arctic waders, in particular, badly need an above-average breeding outcome in 2013.

ACKNOWLEDGEMENTS

Members of the VWSG and AWSG are greatly thanked for sustained fieldwork effort over several months in the 2012-13 non-breeding season. Only by their considerable perseverance can the annual long-term monitoring of a range of species in SEA and NWA be successfully carried out. Gaps in the data greatly reduce the practicability of determining the primary factors influencing breeding success.

All those who have facilitated access to our various monitoring sites and the carrying out of fieldwork are greatly thanked, especially Broome Bird Observatory and Anna Plains Station in NWA. Some financial support for fieldwork activities is most generously provided by Coastcare in SEA and by the WA Department of Environment and Conservation in NWA. The Australian Bird Banding Scheme and the various state environment/conservation bodies also kindly provided appropriate licences and, where necessary, ethics and other animal catcher approvals.

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Table 1. Percentage of juvenile/first year waders in cannon-net catches in south-east Australia in 2012/13

Species	**No. of catches**		**Total caught**	**Juv./ 1st year**		**Long term median* % juvenile (years)**	**Assessment of 2012 breeding success**
	Large (>50)	**Small (<50)**		**No.**	**%**		
Red-necked Stint *Calidris ruficollis*	6	7	1902	414	**21.8**	14.5 (34)	Good
Curlew Sandpiper *C. ferruginea*	1	6	329	11	**3.3**	9.8 (33)	Very poor
Bar-tailed Godwit *Limosa lapponica*	0	2	77	15	**19.5**	17.9 (23)	Average
Red Knot *C. canutus*	0	1	1	0	-	58.0 (18)	-
Ruddy Turnstone *Arenaria intepres*	1	22	546	13	**2.4**	10.1 (22)	Very poor
Sanderling *C. alba*	4	4	674	19	**2.8**	10.1 (21)	Very poor
Sharp-tailed Sandpiper *C. acuminata*	0	8	116	21	**18.1**	10.7 (31)	Good

All birds cannon-netted in period 15 November to 25 March except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April.

* Does not include the 2012/2013 figures

Table 2. Percentage of juvenile/first year waders in cannon-net catches in north-west Australia in 2012/2013

Species	**No. of catches**		**Total caught**	**Juv/1st year**		**Assessment of 2012 breeding success**
	Large (>50)	**Small (<50)**		**No.**	**%**	
Great Knot *Calidris tenuirostris*	6	4	899	59	6.6	Poor
Bar-tailed Godwit *Limosa lapponica*	2	6	184	14	7.6	Below average
Red-necked Stint *C. ruficollis*	3	5	583	86	14.8	Below average
Red Knot *C. canutus*	1	8	130	2	1.5	Very poor
Curlew Sandpiper *C. ferruginea*	0	7	108	2	1.9	Very poor
Ruddy Turnstone *Arenaria intepres*	0	8	24	0	0	Very poor
Sanderling *C. alba*	0	4	31	1	3.2	Very poor
Non-arctic northern migrants						
Greater Sand Plover *Charadrius leschenaultii*	4	7	393	111	28.2	Good
Terek Sandpiper *Xenus cinereus*	1	7	187	23	12.3	Average
Grey-tailed Tattler *Heteroscelus brevipes*	3	6	584	104	17.8	Average
Broad-billed Sandpiper *Limicola falcinellus*	0	2	22	4	18.4	Average

All birds cannon-netted in period 1 November to mid-March

Table 3. Percentage of first year birds in wader catches in south-east Australia 1998/1999 to 2012/13

Species	**98/99**	**99/00**	**00/01**	**01/02**	**02/03**	**03/04**	**04/05**	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	***Average (14yrs)***
Ruddy Turnstone *Arenaria interpres*	6.2	29	10	9.3	17	6.7	12	28	1.3	19	0.7	19	26	10	24	*13.9*
Red-necked Stint *Calidris ruficollis*	32	23	13	35	13	23	10	7.4	14	10	15	12	20	16	21.8	*17.1*
Curlew Sandpiper *C. ferruginea*	4.1	20	6.8	27	15	15	22	27	4.9	33	10	27	(-)	4	3.3	*16.6*
Sharp-tailed Sandpiper *C. acuminata*	11	10	16	7.9	20	39	42	27	12	20	3.6	32	(-)	5	18.1	*18.8*
Sanderling *C. alba*	10	13	2.9	10	43	2.7	16	62	0.5	14	2.9	19	21	2	2.8	*15.6*
Red Knot *C. canutus*	(2.8)	38	52	69	(92)	(86)	29	73	58	(75)	(-)	(-)	78	68	(-)	*58.1*
Bar-tailed Godwit *Limosa lapponica*	41	19	3.6	1.4	16	2.3	38	40	26	56	29	31	10	18	19.5	*23.5*

All birds cannon-netted between 15 November and 25 March, except Sharp-tailed Sandpiper and Curlew Sandpiper to end February only and some Ruddy Turnstone and Sanderling to early April. Averages (for previous 14years) exclude figures in brackets (small samples) and exclude 2012/13 figures

Table 4. Percentage of first year birds in wader catches in north-west Australia 1998/1999 to 2012/2013

Species	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	Average (14yrs)
Red-necked Stint *Calidris ruficollis*	26	46	15	17	41	10	13	20	21	20	10	17	18	24	14.8	*21.2*
Curlew Sandpiper *C. ferruginea*	9.3	22	11	19	15	7.4	21	37	11	29	10	35	24	1	1.9	*18.1*
Great Knot *C. tenuirostris*	2.4	4.8	18	5.2	17	16	3.2	12	9.2	12	6	41	24	6	6.6	*12.6*
Red Knot *C. canutus*	3.3	14	9.6	5.4	32	3.2	(12)	57	11	23	12	52	16	8	1.5	*18.9*
Bar-tailed Godwit *Limosa lapponica*	2.0	10	4.8	15	13	9.0	6.7	11	8.5	8	4	28	21	8	7.6	*10.6*
Non-arctic northern migrants																
Greater Sand Plover *Charadrius leschenaultii*	25	33	22	13	32	24	21	9.5	21	27	27	35	17	19	28.2	*23.3*
Terek Sandpiper *Xenus cinereus*	12	(0)	8.5	12	11	19	14	13	11	13	15	19	25	5	12.3	*13.7*
Grey-tailed Tattler *Heteroscelus brevipes*	26	(44)	17	17	9.0	14	11	15	28	25	38	24	31	20	17.8	*21.2*

All birds cannon netted in the period 1 November to mid-March. Averages (for pervious 14 years) exclude figures in brackets (small samples) and exclude 2012/13 figures.